We claim:

1. A method for screening a candidate compound for its ability to interact with at least one transmembrane protein comprising:

transfecting a cell with at least one nucleotide sequence encoding a protein comprising a transmembrane protein containing at least one nuclear localisation sequence (NLS) and a detectable moiety and permitting expression of the encoded protein in the cell;

contacting the cell with a candidate compound; and

determining the distribution of the expressed protein in the cell by detecting the distribution of the detectable moiety in the cell;

wherein detection of an altered distribution of the detectable moiety in the cell relative to the distribution of the detectable moiety in a control cell not contacted with the candidate compound indicates that the compound interacts with the transmembrane protein.

2. The method of claim 1 wherein the detectable moiety is a detectable peptide comprising an antigenic portion of the amino acid sequence of the transmembrane protein.

3. The method of claim 1 wherein the nucleotide sequence encodes a fusion protein comprising a transmembrane protein containing at least one NLS and a detectable moiety.

4. The method of any one of claims 1 to 3 wherein the wild type transmembrane protein contains an NLS.

5. The method of any one of claims 1 to 3 wherein the wild type transmembrane protein lacks an NLS and the nucleotide sequence encoding the transmembrane protein is modified to encode an NLS.

6. The method of claim 5 wherein the nucleotide sequence is modified to encode an NLS selected from Table 1.

7. The method of claim 5 wherein the nucleotide sequence is modified to encode an amino acid sequence selected from the group consisting of KKFKR, PKKKRKV and AFSAKKFKR.

8. The method of any one of claims 1 to 7 wherein the cell is a eukaryotic cell or a prokaryotic cell.

9. The method of claim 8 wherein the cell is a eukaryotic cell selected from the group consisting of a mammalian cell, a yeast cell, an insect cell, a nematode cell, a plant cell and a fungal cell.

10. The method of claim 9 wherein the nucleated cell is a mammalian cell selected from the group consisting of HEK, COS and CHO cells.

11. The method of claim 3 wherein the detectable moiety is an antigenic peptide and the distribution of the antigenic peptide in the cell is determined by allowing it to bind to an antibody-based detection system comprising an antibody specific for the antigenic peptide.

12. The method of claim 11 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and a second antibody carrying a detectable label and specific for the first antibody.

13. The method of claim 11 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and carrying a detectable label.

14. The method of claim 12 or 13 wherein the detectable label is an optically detectable label.

15. The method of claim 14 wherein the detectable label is a luminescent label or a fluorescent label.

16. The method of claim 3 wherein the detectable moiety is a polypeptide selected from the group consisting of green fluorescent protein, red fluorescent protein and modified variants thereof.

17. The method of any one of claims 1 to 16 wherein the transmembrane protein is selected from the group consisting of a G protein coupled receptor (GPCR), a transporter, a cytokine receptor, a tyrosine kinase receptor and a low density lipoprotein (LDL) receptor.

18. The method of claim 17 wherein the transmembrane protein is a GPCR.

19. The method of claim 18 wherein the GPCR is selected from the group consisting of dopamine D1 receptor, dopamine D2 receptor, dopamine D3 receptor, dopamine D5 receptor, histamine 1 receptor, cysteinyl leukotriene receptor 1, cysteinyl leukotriene receptor 2, opioid receptor, muscarinic receptor, serotonin receptor, beta2-adrenergic receptor and metabotropic glutamate 4 receptor.

20. The method of claim 17 wherein the transmembrane protein is a transporter.

21. The method of claim 20 wherein the transporter is selected from the group consisting of dopamine transporter and serotonin transporter.

22. The method of claim 17 wherein the transmembrane protein is a cytokine receptor.

23. The method of claim 22 wherein the cytokine receptor is selected from the group consisting of erythropoietin receptor and insulin receptor.

24. The method of claim 17 wherein the transmembrane protein is a tyrosine kinase receptor.

25. The method of claim 24 wherein the tyrosine kinase receptor is selected from the group consisting of epidermal growth factor receptor and insulin receptor.

26. The method of claim 17 wherein the transmembrane protein is a low density lipoprotein receptor.

27. The method of any one of claims 1 to 26 wherein the cell is transfected with a plurality of nucleotide sequences, each of said sequences encoding a protein comprising a different transmembrane protein containing at least one NLS.

28. The method of claim 27 wherein each of said nucleotide sequences encodes a protein comprising a different detectable moiety.

29. The method of claim 27 wherein at least one detectable moiety is common to at least two encoded proteins.

30. The method of claim 1 wherein the cell is contacted with a compound known to interact with the at least one transmembrane protein prior to contacting the cell with the candidate compound and

wherein detection of an altered distribution of the detectable moiety in the cell relative to the distribution of the detectable moiety in a control cell contacted with the compound known to interact with the transmembrane protein but not contacted with the candidate compound indicates that the candidate compound interacts with the transmembrane protein.

31. The method of any one of claims 1 to 30 wherein detection of an altered distribution of the detectable moiety in the cell comprises detection of an altered level of the detectable moiety associated with the cell membrane.

32. The method of claim 31 wherein detection of an altered distribution of the detectable moiety comprises detection of a reduced level of the detectable moiety associated with the cell membrane.

33. The method of claim 32 wherein detection of an altered distribution of the detectable moiety comprises detection of an increased level of the detectable moiety associated with the cell membrane.

34. The method of any one of claims 1 to 30 wherein detection of an altered distribution of the detectable moiety in the cell comprises detection of an altered level of the detectable moiety in the nucleus of the cell.

35. The method of claim 34 wherein detection of an altered distribution of the detectable moiety comprises detection of a reduced level of the detectable moiety in the nucleus of the cell.

36. The method of claim 31 wherein detection of an altered distribution of the detectable moiety comprises detection of an increased level of the detectable moiety in the nucleus of the cell.

37. A method for screening a candidate compound for its ability to interact with at least one transmembrane protein comprising:

transfecting a cell with at least one nucleotide sequence encoding an NLS-containing transmembrane protein and permitting expression of the encoded protein in the cell;

contacting the cell with a candidate compound; and

determining the level of NLS-containing transmembrane protein remaining at the cell membrane by isolating the cell membrane fraction of the cell, contacting the fraction with a labelled ligand of the transmembrane protein and determining the level of binding of the ligand to the fraction;

wherein detection of an altered level of the transmembrane protein at the cell membrane relative to the level at the cell membrane in a control cell not contacted with the candidate compound indicates that the compound interacts with the transmembrane protein.

38. The method of claim 37 wherein the labelled ligand is a radio-labelled ligand.

39. The method of any one of claims 37 to 38 wherein the wild type transmembrane protein contains an NLS.

40. The method of any one of claims 37 to 38 wherein the wild type transmembrane protein lacks an NLS and the nucleotide sequence encoding the transmembrane protein is modified to encode an NLS.

41. The method of claim 40 wherein the nucleotide sequence is modified to encode an NLS selected from Table 1.

42. The method of claim 40 wherein the nucleotide sequence is modified to encode an amino acid sequence selected from the group consisting of KKFKR, PKKKRKV and AFSAKKFKR.

43. The method of any one of claims 37 to 42 wherein the cell is a eukaryotic cell or a prokaryotic cell.

44. The method of claim 43 wherein the cell is a eukaryotic cell selected from the group consisting of a mammalian cell, a yeast cell, an insect cell, a nematode cell, a plant cell and a fungal cell.

45. The method of claim 44 wherein the cell is a mammalian cell selected from the group consisting of HEK, COS and CHO cells.

46. The method of any one of claims 37 to 45 wherein the transmembrane protein is selected from the group consisting of a G protein coupled receptor (GPCR), a transporter, a cytokine receptor, a tyrosine kinase receptor and a low density lipoprotein (LDL) receptor.

47. The method of claim 46 wherein the transmembrane protein is a GPCR.

48. The method of claim 47 wherein the GPCR is selected from the group consisting of dopamine D1 receptor, dopamine D2 receptor, dopamine D3 receptor, dopamine D5 receptor, histamine 1 receptor, cysteinyl leukotriene receptor 1, cysteinyl leukotriene receptor 2, opioid receptor, muscarinic receptor, serotonin receptor, beta2-adrenergic receptor, and metabotropic glutamate 4 receptor.

49. The method of claim 46 wherein the transmembrane protein is a transporter.

50. The method of claim 49 wherein the transporter is selected from the group consisting of dopamine transporter and serotonin transporter.

51. The method of claim 46 wherein the transmembrane protein is a cytokine receptor.

52. The method of claim 51 wherein the cytokine receptor is selected from the group consisting of erythropoietin receptor and insulin receptor.

53. The method of claim 46 wherein the transmembrane protein is a tyrosine kinase receptor.

54. The method of claim 53 wherein the tyrosine kinase receptor is selected from the group consisting of epidermal growth factor receptor and insulin receptor.

55. The method of claim 46 wherein the transmembrane protein is a low density lipoprotein receptor.

56. The method of any one of claims 37 to 55 wherein the cell is transfected with a plurality of nucleotide sequences, each of said sequences encoding a protein comprising a different transmembrane protein containing at least one NLS.

57. The method of claim 56 wherein each of said nucleotide sequences encodes a protein comprising a different detectable moiety.

58. The method of claim 56 wherein at least one detectable moiety is common to at least two encoded proteins.

59. The method of claims 37 to 58 wherein detection of an altered distribution of the detectable moiety comprises detection of a reduced level of the detectable moiety associated with the cell membrane.

60. The method of claims 37 to 58 wherein detection of an altered distribution of the detectable moiety comprises detection of an increased level of the detectable moiety associated with the cell membrane.

61. An isolated cell transfected with at least one nucleotide sequence encoding a protein comprising a transmembrane protein containing at least one NLS and a detectable moiety.

62. The cell of claim 61 wherein the detectable moiety is a detectable peptide comprising an antigenic portion of the amino acid sequence of the transmembrane protein.

63. The cell of claim 61 wherein the nucleotide sequence encodes a fusion protein comprising a transmembrane protein containing at least one NLS and a detectable moiety.

64. The cell of any one of claims 61 to 63 wherein the wild type transmembrane protein contains an NLS.

65. The cell of any one of claims 61 to 63 wherein the wild type transmembrane protein lacks an NLS and the nucleotide sequence encoding the transmembrane protein is modified to encode an NLS.

66. The cell of claim 65 wherein the nucleotide sequence is modified to encode an NLS selected from Table 1.

67. The cell of claim 65 wherein the nucleotide sequence is modified to encode an amino acid sequence selected from the group consisting of KKFKR, PKKKRKV and AFSAKKFKR.

68. The cell of claim 63 wherein the detectable moiety is an antigenic peptide and the distribution of the antigenic peptide in the cell is determined by allowing it to bind to an antibody-based detection system comprising an antibody specific for the antigenic peptide.

69. The cell of claim 68 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and a second antibody carrying a detectable label and specific for the first antibody.

70. The cell of claim 68 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and carrying a detectable label.

71. The cell of claim 68 or 69 wherein the detectable label is an optically detectable label.

72. The cell of claim 68 or 69 wherein the detectable label is a luminescent label or a fluorescent label.

73. The cell of claim 63 wherein the detectable moiety is a polypeptide selected from the group consisting of green fluorescent protein, red fluorescent protein and modified variants thereof.

74. The cell of any one of claims 61 to 73 wherein the transmembrane protein is selected from the group consisting of a G protein coupled receptor (GPCR), a transporter, a cytokine receptor, a tyrosine kinase receptor and a low density lipoprotein (LDL) receptor.

75. The cell of claim 74 wherein the transmembrane protein is a GPCR.

76. The cell of claim 75 wherein the GPCR is selected from the group consisting of dopamine D1 receptor, dopamine D2 receptor, dopamine D3 receptor, dopamine D5 receptor, histamine 1 receptor, cysteinyl leukotriene receptor 1, cysteinyl leukotriene receptor 2, opioid receptor, muscarinic receptor, serotonin receptor, beta2-adrenergic receptor and metabotropic glutamate 4 receptor.

77. The cell of claim 74 wherein the transmembrane protein is a transporter.

78. The cell of claim 77 wherein the transporter is selected from the group consisting of dopamine transporter and serotonin transporter.

79. The cell of claim 74 wherein the transmembrane protein is a cytokine receptor.

80. The cell of claim 79 wherein the cytokine receptor is selected from the group consisting of erythropoietin receptor and insulin receptor.

81. The cell of claim 74 wherein the transmembrane protein is a tyrosine kinase receptor.

82. The cell of claim 81 wherein the tyrosine kinase receptor is selected from the group consisting of epidermal growth factor receptor and insulin receptor.

83. The cell of claim 74 wherein the transmembrane protein is a low density lipoprotein receptor.

84. The cell of any one of claims 61 to 83 transfected with a plurality of nucleotide sequences, each of said sequences encoding a protein comprising a different transmembrane protein containing at least one NLS.

85. The cell of claim 84 wherein each of said nucleotide sequences encodes a protein comprising a different detectable moiety.

86. The cell of claim 84 wherein at least one detectable moiety is common to at least two encoded proteins.

87. The cell of any one of claims 61 to 86 wherein the cell is a eukaryotic cell or a prokaryotic cell.

88. The cell of claim 87 wherein the cell is a eukaryotic cell selected from the group consisting of a mammalian cell, a yeast cell, an insect cell, a nematode cell, a plant cell and a fungal cell.

89. The cell of claim 88 wherein the cell is a mammalian cell selected from the group consisting of HEK, COS and CHO cells.

90. The cell of claim 88 wherein the cell is a neuronal cell.

91. A compound identified as capable of interacting with a transmembrane protein by the method of any one of claims 1 to 60.

92. A method for determining whether a first protein and a second protein are able to oligomerise comprising:

transfecting a cell with a first nucleotide sequence encoding a first protein containing an NLS and a second nucleotide sequence encoding a second protein comprising a detectable moiety and permitting expression of the encoded first and second proteins in the cell; and

determining the distribution of the detectable moiety in the cell;

wherein detection of the detectable moiety in or adjacent to the nucleus of the cell or detection of a reduced level of the detectable moiety at the cell surface, relative to a control cell, indicates that the first and second proteins interact.

93. The method of claim 92 wherein the first and second proteins are different transmembrane proteins.

94. The method of claim 92 wherein the first and second proteins are the same transmembrane protein.

95. The method of claim 92 wherein one of the first and second proteins is a transmembrane protein and the other is a non-transmembrane protein.

96. The method of any one of claims 92 to 94 wherein the first and second proteins are GPCRs.

97. The method of any one of claims 92 to 96 wherein the detectable moiety is a detectable peptide comprising an antigenic portion of the amino acid sequence of the second protein.

98. The method of claim 92 wherein the second nucleotide sequence encodes a fusion protein comprising the second protein and a detectable moiety.

99. The method of any one of claims 92 to 94 wherein the wild type first protein contains an NLS.

100. The method of any one of claims 92 to 94 wherein the wild type first protein lacks an NLS and the first nucleotide sequence encoding the first protein is modified to encode an NLS.

101. The method of claim 100 wherein the first nucleotide sequence is modified to encode an NLS selected from Table 1.

102. The method of claim 100 wherein the first nucleotide sequence is modified to encode an amino acid sequence selected from the group consisting of KKFKR, PKKKRKV and AFSAKKFKR.

103. The method of any one of claims 92 to 102 wherein the cell is a eukaryotic cell or a prokaryotic cell.

104. The method of claim 103 wherein the cell is a eukaryotic cell selected from the group consisting of a mammalian cell, a yeast cell, an insect cell, a nematode cell, a plant cell and a fungal cell.

105. The method of claim 104 wherein the cell is a mammalian cell selected from the group consisting of HEK, COS and CHO cells.

106. The method of claim 92 wherein the detectable moiety is an antigenic peptide and the distribution of the antigenic peptide in the cell is determined by allowing it to bind to an antibody-based detection system comprising an antibody specific for the antigenic peptide.

107. The method of claim 106 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and a second antibody carrying a detectable label and specific for the first antibody.

108. The method of claim 106 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and carrying a detectable label.

109. The method of claim 108 wherein the antibody-based detection system comprises a first antibody specific for the antigenic peptide and carrying a detectable label.

110. The method of claim 109 wherein the detectable label is an optically detectable or fluorescent label.

111. The method of claim 110 wherein the detectable label is a luminescent label or a fluorescent label.

112. The method of claim 92 wherein the detectable moiety is a polypeptide selected from the group consisting of green fluorescent protein, red fluorescent protein and modified variants thereof.

113. The method of any one of claims 93 to 112 wherein the first and second proteins are transmembrane proteins selected from the group consisting of a G protein coupled receptor (GPCR), a transporter, a cytokine receptor, a tyrosine kinase receptor and a low density lipoprotein (LDL) receptor.

114. The method of claim 113 wherein the at least one transmembrane protein is a GPCR selected from the group consisting of dopamine D1 receptor, dopamine D2 receptor, dopamine D3 receptor, dopamine D5 receptor, histamine 1 receptor, cysteinyl leukotriene receptor 1, cysteinyl leukotriene receptor 2, opioid receptor, muscarinic receptor, serotonin receptor, beta2-adrenergic receptor, and metabotropic glutamate 4 receptor.

115. The method of claim 113 wherein the at least one transmembrane protein is a transporter.

116. The method of claim 115 wherein the at least one transmembrane protein is a transporter selected from the group consisting of dopamine transporter and serotonin transporter.

117. The method of claim 113 wherein at least one transmembrane protein is a cytokine receptor.

118. The method of claim 117 wherein the at least one transmembrane protein is a cytokine receptor selected from the group consisting of erythropoietin receptor and insulin receptor.

119. The method of claim 113 wherein at least one transmembrane protein is a tyrosine kinase receptor.

120. The method of claim 119 wherein the at least one transmembrane protein is a tyrosine kinase receptor selected from the group consisting of epidermal growth factor receptor and insulin receptor.

121. The method of claim 113 wherein at least one transmembrane protein is a low density lipoprotein receptor.

122. The method of claim 92 wherein the first nucleotide sequence encodes a first protein further comprising a detectable moiety different from the detectable moiety of the second protein, wherein detection of an energy transfer interaction between the detectable moiety of the first protein and the detectable moiety of the second protein indicates that the first and second proteins oligomerise.